

STEM CONNECTION

Building excitement through Science, Technology, Engineering, and Math

Tools & Tidbits

Web Resources

[MaKey MaKey](#) Invention Kits for Everyone.

[Scratch](#) Free online program for creating interactive stories, games, and animations .

[Illuminations](#): Resources for Teaching Math from NCTM. A digital newsletter with engaging resources, lessons, and activities (K-12).

STEM in the News

[Young Alaska robotics teams compete in state competition](#)

⇒ [Photos](#)

[Tsunami Bowl](#)

STEM Activity

One Challenge, One Solution

By Chip McMillan, UAS

Alaska is rich in resources such as fossil fuels, minerals, marine and terrestrial life, and freshwater. The metals we mine in Alaska, including silver, gold and lead, are components in electronic devices the whole world uses.

When we upgrade our devices what happens to the old outdated technology and the minerals within them? According to the EPA, for every million cell phones we recycle 35 pounds of copper, 772 pounds of silver, 75 pounds of gold and 33 pounds of palladium can be recovered. A reputable recycler will refurbish the technology so it can still be used, but if that is not an option the devices will be mechanically shredded. Here lies a new problem: how can these recyclable metals be sorted from the shredded mixture?



Metals being separated by flotation in a mine in Alaska

In mining, they need to separate the valuable minerals from their ores after they are extracted from the earth. Similarly, metals need to be separated from discarded and outdated technology to be reused and repurposed. A simple engineering technique can help both the mining industry in Alaska and the recycling industry - physical separation.

Understanding separation can help your students think as engineers to help Alaskans try to recycle trash. As you can tell, this can also work well with a social studies lesson (environmental concerns, unethical recycling practices, etc.).

I use the *Separation of Mixtures* kit from [Transparent Devices](#), which physically separates different types of recycling plastics on the basis of density. You slowly increase the density of the water they are suspended in by adding Epsom salts and then skim off each successive layer of plastic made buoyant by the density increase.*

Following the activity, students could be challenged to design a method of mechanically separating the different components of electronic devices.



Upcoming Events



Navigating the Tides of Change

October 23-25
Sitka, AK

2015 Alaska Math and Science Conference

<http://www.ams2015.org/>

Worth Quoting:

Science is not only a discipline of reason but, also one of romance and passion.

-Stephen Hawking

*See page 3 for a writing connection to the physical separation activity.

Spotlight on Schools



Students created a maze in Scratch, using math and learning coding. They programed the navigation of the maze and then used the Makey-Makey as the controls.

Creating Games

Submitted by Craig City Schools

Students in Lorraine Pierce's 5th grade class in Craig used [Scratch](#) and [MaKey-MaKey](#) to create a game. Their maze was built in Scratch, a free online resource that allows students of all ages to create interactive stories, games and animations. Programming in Scratch is done by connecting a series of blocks (code) together to move, create sound and change the appearance of the game piece (or sprite). The sprite is then controlled by the keyboard. These students didn't stop there. They created their own controller using alligator clips, index cards, tin foil, a variety of snack items, and the MaKey-MaKey USB connector bypassing the keyboard altogether. In order to create this project these students had to think creatively, work collaboratively and reason systematically.

Equipment for this project was provided by the SYSTEMS grant with mentoring by Ellen Hannon, [Southeast Alaska Small Schools Math Network](#).



FIRST Robotics in Alaska – Winning means partnerships that last.

"3-2-1 LEGO!" Students involved in *FIRST* LEGO League (FLL) know that this signals the beginning of the 2 1/2 minute robot challenge at local or state competitions. The crowd goes wild as the teams send their robots out to complete the challenges set up on the competition table. Most participants in *FIRST* Robotics attend a class at school or participate in an afterschool program.

FIRST (For Inspiration and Recognition of Science and Technology) is an international not-for-profit organization founded by Dean Kamen, inventor of the Segway, to inspire young people's interest and participation in science and technology.

FIRST includes four levels of robotics programs: Junior *FIRST* LEGO League, *FIRST* LEGO League, *FIRST* Tech Challenge, and *FIRST* Robotics Challenge.

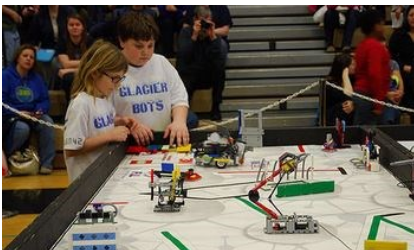
FIRST Lego League Competition Together they serve students K-12. Although the robotics competition is the most visible part of the programs, *FIRST* programs promote collaboration, teamwork, and sportsmanship in their core values.

At the 2015 Alaska State FLL Tournament in Anchorage, the Championship Award went to the Brick Masters from Bear Valley Elementary. This talented team will represent Alaska in St. Louis at the World Festival, a celebration of the FLL season. Alaska Airlines, a partner with *FIRST* Robotics in Alaska, is providing flights for the team to attend the event.

The Black Bears, from Randy Smith Middle School, won the Fairbanks Championship and will represent Alaska at the North American Open in LEGOLAND.

On February 21 teams from Chefnak to Sitka will meet at the Alaska Airlines Center in Anchorage for two exciting days of robot action at Alaska's *FIRST* Tech Challenge Championship Tournament vying for one of six spots to represent Alaska at the FTC West Super Regional in Oakland, CA.

For more information about *FIRST* programs contact Rebecca Soza, *FIRST* programs coordinator, at rsoza@jedc.org. Check out *FIRST* Robotics programs in Alaska at <http://www.fllalaska.com/about>.



FIRST Tech Challenge team making adjustments in the pit area.



Tsunami Bowl

Ending an 8-year winning streak by Juneau-Douglas High School, the team from Mat-Su Career & Technical High School has won the 18th annual Alaska regional competition.

The Tsunami Bowl is a regional ocean sciences competition that is part of the National Ocean Sciences Bowl (SOSB). This competition aims to recognize and reward excellence among students interested in ocean studies.

The competition consists of a research paper on a specific ocean-related question or problem. Teams submit their papers in December and present their project to a panel of judges at the Tsunami Bowl in February or March. Teams also compete in a quiz competition. This round robin double elimination tournament has teams "buzz in" and answer multiple choice or short answer questions. The final portion of the quiz sections is a team challenge problem that test the teams' critical thinking skills.

Three \$5,000 scholarships are available to Tsunami Bowl students to be used for college tuition at any campus of the University of Alaska.

For more information about the program or how to start your own team go to:

<https://seagrant.uaf.edu/nosb/>

Do you have ideas for articles or resources? Please let me know.

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Math Corner

Number Talks

Number talks are short (5-15 minute) ongoing activities that provide students the opportunity to talk about numbers in a variety of ways on a daily basis. During a

number talk, students work on computational fluency by explaining their thinking and listening to the thinking of others. According to *Principles to Actions* (NCTM, 2014) "facilitating meaningful mathematical discourse" creates a culture that honors student thinking. Number talks allow students to respond to each other's mathematical thinking, not just to questions posed by the teacher. This type of student discourse allows students to see problems solved in a variety of ways (MP.3).

[Using Number Talks to Build Students' Math Reasoning.](#)

- ◇ Parish, S. (2014). *Number talks: Helping children build mental math and computation strategies*. Sausalito: Math Solutions.
- ◇ Smith, M., & Stein, M. (2011). *5 Practices for orchestration productive mathematics discussions*. Reston: NCTM/Corwin.

Examples of Number Talks in action

[K-2 Rekenrek](#)
[3rd Grade Subtraction](#)
[5th Grade Division](#)
[6th Grade Percent](#)

Science Corner

My Dad's an Alien

Communication could be seen as the "glue" that binds all student learning together. Students have to communicate by writing in English

class, by writing up lab notes in a science class, and showing their work in math class. If we think about it, they are being asked to communicate the evidence from what they read, what they observe and the reasoning behind what they do. STEM is a way to connect different disciplines that uses communication as a vehicle. Since standards is my work, I see some very obvious connections with clear guidelines as to student expectations. In mathematics it is Mathematical Practice 3 (Construct viable arguments and critique the reasoning of others). In English Language Arts classes students are asked to use evidence from text to answer questions, compare/contrast and analyze the connections between several texts. [My Dad's and Alien](#) is a clever short video that demonstrates using observations to make a claim, providing the evidence to support that claim in order to provide a viable explanation.

Resources for writing in the science and mathematics classroom:

[Framework for Constructing Scientific Explanations](#)

[Claims, Evidence, Reasoning Graphic Organizer](#)

[Getting Past "Just Because" Teaching Writing in Science Class](#)

